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A Risk Analysis and Screening Approach for Climate Change Mitigation and Adaptation Options: A Tool for Climate Action Planning

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ABBREVIATIONS AND ACRONYMS

CBA	Cost benefit analysis
CC	Climate Change
CBA	Cost-Benefit Analysis
CEA	Cost Effectiveness Analysis
CO2	Carbon Dioxide
ECETOCO	European Center for Ecotoxicology and Toxicology of Chemical
EPA	Environmental Protection Agency
ERA	Environmental Risk Assessment
EU	European Union
EUSES	European Union System for the Evaluation of Substances
ESIF	European Structural and Investment Fund
GHG	Greenhouse Gas Emissions
IPCC	Intergovernmental Panel on Climate Change
MCA	Multi-criteria analysis
MECC	Ministry of Environment and Climate Change
MFF	Multi-annual Financial Framework
MS	Member State
PEF	Product Environmental Footprint
PEFCR	Product Environmental Footprint Category Rules
OP	Operational Program
PA	Partnership Agreement
PV	Photo Voltaic
PEF	Product Environmental Footprint
RAS	Reimbursable Advisory Services
REACH	Registration, Evaluation and Authorization of Chemicals
RWNA	Romanian Waters National Administration
SEA	Strategic Environmental Assessment
UK	United Kingdom

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EXECUTIVE SUMMARY

Adaptation and mitigation measures contribute to lowering climate change (CC) risks, impacts and vulnerabilities while delivering broader economic, social and environmental benefits. Nevertheless these measures may involve higher costs as well as financial, social, institutional, technical or technological risks. Therefore, it is important that the decision making process identifies these potential risks and associated costs and counter-balances these risks with the anticipated benefits. It is also important to raise awareness of and preparedness for residual climate risks that will remain even after robust mitigation and adaptation measures are adopted.

This report proposes the use of climate screening procedure for assessing and prioritizing adaptation and mitigation measures based on their benefits, costs and risks. This qualitative screening approach is based on expert judgment. When additional information is needed for decision-making, this screening process can be followed by in-depth analysis such as multi-criteria analysis, cost effectiveness analysis, cost benefit analysis, or modeling.

Screening processes are already being used in several EU member states and by the Commission itself. The UK has used a climate screening approach to prepare its CC action plan, while Ireland is proposing a screening in order to frame Strategic Environmental Assessments (SEAs), and the Commission is using screening approaches for dangerous substances and for the environmental footprint of products.

To prepare a national climate change action plan competent authorities have to select both mitigation and adaptation measures / options for different key sectors (energy, transport, water, agriculture, etc.). These measures can be classified in various categories as proposed: physical investments, economic incentives, legal instruments and standard, etc. Each measure / option has specific benefits, costs and risks/barriers (e.g. institutional, social, technological, and financial). This report argues that the first priority should be given to no-regret actions, i.e. those whose benefits exceeds the costs even without considering CC impacts and whose risks are low.

As it will be impossible to select only no-regret measures for inclusion in the action plan, it is important to have a process that will help prioritize actions with significant risks and net costs. Such a process should answer the following questions:

- What are the types of risks associated with a specific measure / option?
- How important (qualitatively) are the expected benefits of the proposed measures / options?

The screening process highlights the potential risks associated with each action, thus providing a better knowledge and transparency for the decision making process.

If the screening highlights significant financial, institutional, or technical, risks with potentially significant associated costs, further analysis should be undertaken prior to the inclusion of such high risk measures in the CC action plan. These specific measures should further pass through quantitative methodologies described in the report, such as multi-criteria analysis, cost effectiveness analysis, or cost-benefit analysis. Furthermore, a suite of sectoral and macro-economic models will help extend the analysis from specific and / or simple measures or programs within certain sectors to complex measures or a combination of measures across sectors and over a longer timeframe. When the screening clearly highlights high risks and low benefits for a specific action, the considered measure should not be included in the CC action plan and should be excluded from further analysis.

The current report has to be seen as a building block in a methodological framework to prepare the Climate Change Action Plan in Romania. The proposed approach allows for a pragmatic and transparent decision making process for the selection of the measures to be included in the action plan. Thanks to this approach, a significant number of measures can be included or excluded from the CC action plan through a qualitative expert assessment. This will save time and resources by using sophisticated analytical methods that usually incur high costs only for those measures for which the qualitative screening process has been inconclusive.

The proposed screening approach is illustrated in the report for the case of energy sector measures. A comprehensive modelling toolkit to complement the screening process and other analytical tools discussed in the report is being developed for Romania under the CC RA Component C.

1. INTRODUCTION[1]

The current report is a milestone for preparing the Romanian Climate Change (CC) action plan. A CC action plan should be based on the consolidation and coordination of both mitigation and adaptation measures / options. An important step in the elaboration of such a plan is the selection of appropriate actions. This selection requires the involvement of competent authorities in the key sectors, including, in the case of Romania, transport, energy, urban, water, agriculture and forestry. The selection process needs to be transparent, pragmatic and reliable. Different categories of measures need to be identified and analyzed in light of the risks and benefits they can induce. Selecting and evaluating the measures are vital for the success of CC policies; nevertheless, this is a time-consuming and costly process.

EU Member States and the Commission have pragmatic views on the use of screening approaches that rely on a qualitative assessment conducted on the basis of expert judgment or software. The screening approaches are used to facilitate a transparent decision-making process in various fields such as environmental impacts, dangerous substances, environmental footprint of products, or CC actions. A significant portion of CC measures could be identified, assessed, selected or excluded with the help of a screening approach based on expert judgment, presented in this report. Nevertheless, for CC actions with benefits that do not clearly outweigh costs or with obvious irreversible effects, an in-depth analysis will be required, such as: Cost Benefit Analysis (CBA), Cost Effectiveness Analysis (CEA), multi-criteria, modeling, etc. The proposed screening approach will enable decision on whether to immediately integrate the considered measure in the CC action plan, or whether to undertake a more in-depth quantitative assessment.

The report is structured as follows. Following this introduction, Section 2 summarizes the usage of screening approaches in the field of CC and environment by different EU Member States and by the European Commission. Section 3 discusses the main categories of mitigation and adaption measures that could be included in a CC action plan. Section 4 presents the screening approach / process and describes several complementary tools (multi-criteria analysis, CBA, CEA, modeling) that should be used when the screening approach is insufficient. Section 5 provides a conclusion and key recommendations.

[1] This report was prepared by Thierry Davy, with inputs from Ionut Purica, Cesar Niculescu, Adina Fagarasan, Cosmin Buteica, and Silvia Pintilii. Kseniya Lvovsky and Jian Xie provided comments and suggestions and helped improve the report. Tamara Levine helped edit it.

2. THE USE OF SCREENING APPROACHES IN THE EU

It is becoming increasingly common for countries to use screening approaches in the field of environment to analyze actions, policy, measures, technologies, and impacts. These screening procedures are largely used in order to:

- ensure that all the possible options are identified;
- make the best use of relevant expert judgment for the considered actions;
- enable selectivity and proceed to more in-depth analysis only when and where necessary;
- create a transparent decision making process; and
- save time and money.

Many screening approaches have been used in the EU in the past years. This chapter briefly describes some of some of these approaches.

2.1 A screening Approach in the UK to develop its CC action plan

A screening approach was utilized for the development of the Climate Change Action Plan in the United Kingdom (UK). The UK is the first country in the world to have adopted a legally-binding long-term framework to decrease greenhouse gas emissions (GHG) and a framework for building the UK's ability to adapt to a changing climate (the Climate Change Act 2008).

Within this legal act, the UK has largely promoted a "no-regrets" approach. At the same time, when developing this legal act, the UK proposed a risk assessment methodology for CC actions dealing both with adaptation and mitigation. The overall aim of this qualitative methodology was to inform UK mitigation and adaptation policies, by assessing the main current and future risks (threats and opportunities) and associated vulnerabilities posed by the current climate and future climate change for the UK to the year 2100.

The overall approach to the risk assessment and subsequent adaptation plan was based on the UK Climate Impacts Program (UKCIP) Risk and Uncertainty Framework (UKCIP, 2003). This methodology was aimed at facilitating an evaluation of risks linked to proposed mitigation and adaptation measures. The UK proposed in a first approach 700 measures to be dealt with in the national action plan for CC. At the end, thanks to the logical steps and the pragmatism of the screening approach only 100 measures required an in depth assessment.

The first step of the assessment, the screening of the proposed measures, eliminated a large number of measures with low returns or unacceptable risks. By eliminating options at this early stage it was possible to greatly reduce the time and costs associate with the Climate Change Action Plan and associated Act. The screening also allowed for the selection of no-regret,

studies, raising awareness, technical assistance, legal tools and standards which don't generate any important risks but do obviously induce benefits.

2.2 A Screening Approach in Ireland for the Implementation of the SEA

The EU's Strategic Environmental Assessment (SEA) Directive (2001/42/EC) requires applying SEA in eleven sectors: Agriculture, Forestry, Fisheries, Energy, Industry, Transport, Waste management, Water management, Telecommunications, Tourism, Town and Country Planning or Land use.

In Ireland, the Irish Environmental Protection Agency (EPA) is in charge of the implementation of the SEA. The EPA applies a five step process as outlines below:

1. Screening (determining whether or not SEA is required)
2. Scoping (determining the range of environmental issues to be covered by the SEA)
3. The preparation of an Environmental Report
4. The carrying out of consultations
5. The integration of environmental considerations into the Plan or Programme

Screening is the first step. It is important to know at the earliest stage if a project requires an SEA or not. This is the role of the screening experts who have to clearly advise the EPA. Identifying all actions that don't require a SEA at an early stage without an in-depth analysis is a cost effective process, and the screening enables key experts to rapidly review key information and assess it against key questions/criteria allowing them to make fairly rapid judgment about whether or not an SEA is required.

2.3 A Screening Approach for Dangerous Substances

The DANTES project is an EU Life-Environment Program that was conducted from September 2002 to September 2005. The consortium working within the DANTES project involved Akzo Nobel, ABB, SCA, TetraPak and Chalmers University of Technology. One of the project's goals was to assess and demonstrate sustainability tools such as Environmental Risk Assessment (ERA) by studying methods and tools available and performing simplified as well as comprehensive environmental risk assessments.

The project compared the European and the United States approaches for risk assessments of dangerous substances. DANTES analyzed and compared two documents: "The technical Guidance Document in Support of Commission Directive 93/67/EEC on Risk Assessment for New Notified Substances and Commission Regulation (EC) No. 1488/94 on Risk Assessment for Existing Substances" prepared for the implementation of the EU regulatory framework REACH (Registration, Evaluation and Authorization of Chemicals) and the United States Environmental Protection Agency's (US EPA) "Proposed Guidelines for Ecological Risk Assessment".

In the case of the EU, a screening approach was used to undertake the risk assessment of the dangerous substances. The European Center for Ecotoxicology and Toxicology of Chemical (ECETOCO) in charge of the risk assessment of these substances is currently using a screening risk assessment tool. ECETOC screening risk tool is based on software using the principles of European Union System for the Evaluation of Substances (EUSES). It is a simplified tool requiring limited data. The instrument can be applied for a first screening at the product portfolio level in order to identify dangerous substances that require further examination. The screening tool tests six different variables for each substance: the emission scenario, the tonnage, the hydrophobicity, the volatility, the biodegradability, and the eco-toxicity.

ECETOC screening is a simplified tool, which allows only rough estimations; when the screening is positive no further analysis is required for the considered substance before the substance will be commercialized or will remain within the EU internal market. Therefore, in-depth analysis will only be carried out for substances where significant doubt regarding the safety of the product remains.

ECETOC Screening Risk Assessment

Emission Scenario	Point source emission, 0.1% release			
Tonnage	10000	t/y		
# of Emission Days	365	days/y		
	0,01	%		
	10	-		
Hydrophobicity	log Kow < 5			
Volatility	VP < 1 Pa			
Biodegradability	Readily biodegradable			
Ecotoxicity	Not classified based on information		100	µg/L

Assessment Result	**No Further Assessment Required**		
	PEC / PNEC	*0,2242*	*-*
	MST (t/y)	*44600,0000*	*t/y*

Screen copy from ECETOC Screening Risk Assessment tool

2.4 A Screening Approach for EU Product Environmental Footprint Category Rules (PEFCR)

A pilot phase of Environmental Footprint (EF) analysis was launched by the European Commission in 2013 with The Product Environmental Footprint (PEF) pilot phase and the

development of Product Environmental Footprint Category Rules (PEFCRs). To obtain a common understanding of Member states of the requirements of an EF at EU level, the Commission has drafted "Guidance for the implementation of the EU Product Environmental Footprint (PEF)".

This guidance document is promoting a screening approach for the PEF. The PEF screening for this specific approach is focused on data collection activities and on data quality priorities for the PEFCR supporting study.

The objective of the PEF screening is to pre-identify key information concerning the products such as:

- Most relevant life cycle stages;
- Most relevant processes;
- Preliminary indication about the most relevant life cycle impact categories;
- Data quality needs;
- Preliminary indication about the definition of the benchmark for the product category/sub-categories in scope.

The PEF screening is based on readily available generic data (life cycle inventory databases, e.g. from commercial databases) in order to obtain a rapid assessment without inducing any additional costs. The objective of this screening is to support the work of the Technical secretariats at EU level. These secretariats are in charge of proposing new products in the EU market. The screening procedure is intended to help them identify, at an early stage, any deviation from the PEF requirements when a new product is to be introduced into the EU internal market.

3. TYPE OF MEASURES / OPTIONS AND ASSOCIATED RISKS

The elaboration of a CC action plan is a key step for addressing CC challenges. The Romanian CC strategy is paving the way to low carbon and climate resilient growth in Romania. Nevertheless, the strategy is a planning tool to identify opportunities and liabilities. The muscle and fibre of climate change action remains in the implementation of agree action. Neverhteless, the prepartion of a climate change action plan is a prerequisite to the implementation of concrete measures to promote low carbon and climate resilient growth .

Climate change and related global agreements mandate substantial policy changes in the coming years. New policies will be needed to address both mitigation and adaptation and the implementation of these policies will require significant investments, economic incentives, legal instruments and standards, technical assistance, and technological solutions. There are different ways to define and classify CC measures / options. The paragraphs below proposes different approaches to the categorisation of actions. When preparing the CC action plan Romania will have to propose its own categories. It is of crucial importance that the categories proposed are practical and reflect real possibilities in terms of the measures or options for climate action in Romania.

3.1 Mitigation and Adaptation Measures: Two Complementary Action Areas for Climate Change Challenges

The Romanian CC strategy adopted by the Government in July 2013 is tackling both mitigation and adaptation. The measures / options to be proposed for the Romanian CC action plan will also need to address both the need to reduce green house gas emissions and the need to build climate resilient growth.

Mitigation measures are defined as actions to limit or control emissions of greenhouse gases (GHG). By addressing the main sources of emission, these measures contribute to limit the total accumulation of GHG. Mitigation actions inevitably have a global dimension as a measure to reduce emission at the local level inherently reduces total global emissions. Mitigation effects do have time lags and slow time constants and they can only be judged on the basis of cumulative impacts in the long run. Mitigation options have to be considered as anticipatory policy. They are ex-ante measures expected to contribute to reducing future CC impacts.

Adaptation measures are adjustments in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation policies can be distinguished, including anticipatory and reactive adaptation, private and public adaptation, and autonomous and planned adaptation. Adaptation policy options are essentially ideas for policies to promote changes in the way we do things to respond to adverse effects due to changes in climate, like using scarce water resources

more efficiently or adapting building codes to future climate conditions and extreme weather events. Adaptation actions represent what people might do to reduce the harm of climate change. Adaptation measures have to be considered as a local solution generating local benefits.

3.2 Categories of Mitigation and Adaptation Measures / Options

This section categorizes climate action options in a few types and describes how they can be evaluated through the screening approach for the purpose of the action planning.

- **Physical investments**

Both mitigation and adaptation measures could require significant investments in infrastructure, facilities and equipment. For instance, improving the production mix of energy (transitioning from coal to renewable energy sources), modernizing district systems, constructing and rehabilitating dykes and dams for flood protection or draught alleviation, and establishing monitoring systems all require significant investments in infrastructure and equipment upgrades. The various risks associated with these investments, as well as expected benefits, will be quickly and qualitatively evaluated in the screening process based on expert judgment. When the result of the screening does not clearly demonstrate whether the perceived risks surpass benefits, the investments will be further subject to in depth analysis using other analytical tools such as multi-criteria method, cost-benefit analysis (CBA), costs effectiveness analysis (CEA), and sectoral or macro-economic modeling) in order to determine if it is valuable to include them in the CC action plan. Lastly, the measures with high risks and low benefits should be excluded from both the action plan and further in-depth analysis.

- **Economic incentives (pricing, taxes, quotas, etc.)**

Economic incentives are an important and widely used group of instruments primarily using pricing signals to generate efficient results through market for promoting mitigation and adaptation activities. For example, carbon markets, carbon taxes, and subsidies for renewable energies are clearly mitigation options that could have an impact on GHG emissions. Financial support to adaptation measures and natural resource charges such as the setting of appropriate water tariffs in order to promote water savings and implementation of water quotas in water scarce areas could be used as a means to promote adaptation actions.

- **Legal instruments and standards**

Legal instruments can also play an important role in mitigation and adaptation of CC impacts. If the 2030 EU climate / energy package will make the 40% of GHG emissions reduction mandatory to member states by 2030, this regulation will have clear impacts on CC mitigation.

Concerning adaptation, the Government may consider preparing legislation and standards to increase the resilience of infrastructure to climate change risks. Promoting technical standards for building energy efficiency is also an example of possible measures stepping up mitigation actions. In the transport sector, the standards of fuel economy and CO2 emissions of new vehicles can be an effective mitigation measure.

- **Technical assistance (training, studies, capacity building, etc.)**

Technical assistance can be a valuable means to support the analytical work, research, staff training and institutional capacity building to enhance the design and implementation of mitigation and adaptation policies. Technical assistance in training, public education, studies and research, and capacity building have been recommended in the action list of climate change and should be undergo ne screening. For example, a rapid assessment report of the water sector has recommended undertake in depth analysis of supply and demand in several Romanian river basins. A transport sector study has recommended more studies on mobility and vulnerability. Public communication activities are also needed to raise the public awareness of climate change and bring various stakeholders together.

- **Selection of technologies**

Technologies are a main driver for both mitigation and adaptation. Selecting new "green", innovative and effective technologies for instance in the field of energy and transport (fuel cells) can be really a breakthrough mitigating CC impacts. In terms of adaptation, promoting drip irrigation systems, for example, could also be considered as an efficient measure. In the field of water desalinization technologies for sea waters have been a key element in a lot of countries (Arabic peninsula, Malta) in terms of CC adaptation. Desalinated waters thanks to new technologies allow furnish a safe water supply at places where there is no or not enough inland water.

- **Insurance mechanisms**[2]

The risks of climate change differ from one country or region to another. The increase in the frequency of extreme events (floods, drought, heat waves, etc.) will have an impact on the demand for insurance and may mandate the use of innovative insurance tools such as weather based index insurance. From this perspective, insurance can be seen as a measure for addressing climate change and disaster risk management. The insurance system, if well designed, could positively impact awareness raising and disaster proofing for adaptation actions and financial decisions. It is subject to screening and evaluation.

[2] World Bank. 2014, Insurance against Climate Change. Financial Disaster Risk Management and Insurance Options for Climate Change Adaptation in Bulgaria

3.3 Associated Risks of CC Measures / Options

The key criteria to classify and rank CC mitigation and adaptation measures / options are the benefits, costs and risks associated with them. The risks have to be taken into account both in terms of intensity (high, medium, low) and in terms of variety (financial, institutional, social, technological, etc.). The screening approach should be designed in such a way as to allow measures with tangible adaptation and / or mitigation benefits and low incremental costs and risks to be directly included in the CC action plan, based on expert judgment without requiring in-depth analysis. In this regard, no-regret measures, i.e. those measures with climate benefits which are economically justified within the existing or soon anticipated cost and price structure, should be the first to be included in the action plan upon consultation with experts.

If CC measures / options involve additional costs and risks, their implementation is also expected to provide additional benefits. The benefits taken into account in the screening approach will include both economic, social, public health benefits as well as CC related benefits such as reduced GHG emissions, diminished impacts of floods or droughts, etc.

The Major Risks Induced by the Implementation of Mitigation and Adaptation Measures

There are following types of risks identified and discussed below. These risks will have to be taken into account within the screening process.

- ***Financing and Financial Risks***

Financial sustainability is critical to the success of a measure introduced for mitigation or adaptation. Especially many adaptation measures do not have sufficient market-based return on investment to be financed by the private sector. Therefore, they are often financed by grants and public money, even if some specific adaptation projects could be undertaken through micro-credit and community-based insurance systems.

For this reason, private investments in climate change are primarily focused on mitigation projects, such as:

- clean energy (power generation, transport);
- energy & material efficiency (building retrofits, power grid efficiency, recycling, waste heat recovery, etc.);
- environmental resources (forestry, agriculture efficiency, waste management).

Climate change mitigation projects can be financed across different asset classes;. There is no single or preferred asset. Bonds, equity and indices of listed securities are possible vehicles, as are private funds (such as clean energy infrastructure funds), direct investment (private company, real estate, lands) and credit (renewable energy credit or carbon credit).

When adaptation or mitigation measures involve high costs and upfront financing needs, for example some new energy technologies or major adaptation infrastructure, a careful economic and financial analysis is needed, including consideration of the modalities available for raising the required financing and developing adequate financing schemes. Some adaptation and mitigation measures have a long-time horizon with uncertain, not fully monetized benefits; thus, raising financing on the market for such measures may be problematic. At the same time, subsidizing such measures may lead to market distortions and fiscal stress. Further, trade-offs that raising such financing (e. g. through policy and regulation) will present for other social priorities and development investment needs should also be assessed.

- ***Social Risks***

The impacts of climate actions will not uniformly impact all groups of people. Some communities face greater climate threats than others. For example climatic impacts will be greater for people who live in climatically vulnerable areas such as areas prone to floods, drought, coastal erosion or sea level rise. Furthermore people who are poor are often more vulnerable due to poor infrastructure, and lower financial, human and technological resources with which provide resilience to climate impacts and autonomous adaptive capacity. When selecting adaptation or mitigation measures, the issues of equity need to be considered. It is important to ensure at a minimum that the potential adverse effects of potential policies or activities would not increase the social risks of those who are already highly vulnerable. For this reason the screening procedures should assess the social risks associated with proposed mitigation or adaptation measures. For instance, a question of affordability would be whether local people are able to afford the services associated with a measure for example a new water unit, new central heating, or more efficient appliances and if the measure recommended is out of reach of the most vulnerable what measures might be put in place to ensure the necessary financing reaches those in need.

- ***Institutional Risks***

With regards to adaptation, there are still many barriers that need to be overcome before appropriate convergence between disaster risk reduction and climate change adaptation can be achieved. For the general public, climate change is mostly perceived ex-post when a disaster (floods) and associated damages (economic and social damages, human losses) happen. At that time authorities are only able to deal with crisis management.

National authorities should give priority to mainstream CC adaptation measures / options and promote working in an integrated way which can help ease the burden of programming and implementing CC measures. The selection of measures / options promoting a proactive and integrated approach at the national level could help limit institutional risks. In terms of CC, the major institutional risks are mainly linked to non-action to adverse effect measures and to the lack of coordination. It is clear that in case of a disaster, populations always struggle to understand why no actions have been taken to reduce vulnerability. There is also the additional risk linked to measures having adverse effects (soil waterproofing, road or railways preventing flood expansion, etc.). Finally, there is the risk that different authorities of a country do not coordinate their respective preventive and crisis measures, which translates into an important institutional risk.

With regards to mitigation, institutional barriers often prevent seemingly no-regret measures with net benefits and quick pay-offs (such as energy efficiency) from being implemented at the needed scale. In the case of energy efficiency measures, the economic benefits usually far outweigh the costs. Nevertheless, the implementation of a successful energy efficiency program remains a difficult process, and institutional processes often pose significant obstacles to implementation. In the absence of a dedicated institutional entity, with a clear mandate and rules, energy efficiency policies are difficult to implement. In light of the fact that energy efficiency is a cross-cutting issue, involving different line ministries and local authorities (MRDPA, Ministry of Energy, Municipalities, etc.), inter-institutional coordination is essential for effective implementation and poor communication between key institutions could translate into a significant risk.

- ***Economic and Technical Feasibility Risk***

Before proposing to implement any adaptation or mitigation measure it is important to be in a position to judge its feasibility economically and technically. There is no “one solution fits all” solution. To assess feasibility, a proposed solution has to be considered in context with pragmatic screening procedures that account for local conditions and realities. Some mitigation measures, such as promoting specific sources of renewable energy, may be accepted in one location but may not be good enough for some regions or countries. For instance, increased hydropower production can only be envisaged if there are sufficient watersheds resources with adequate water flow rates. Similarly adaptation measures that take place along the river require appropriate forms of structural flood protection. In that sense, it is impossible to propose a standardized measure for both mitigation and adaptation to be applied everywhere. There is a need to judge, on a case by case basis, the economic and technical feasibility and recommend the most appropriate options in the local context.

- ***Technological Risks***

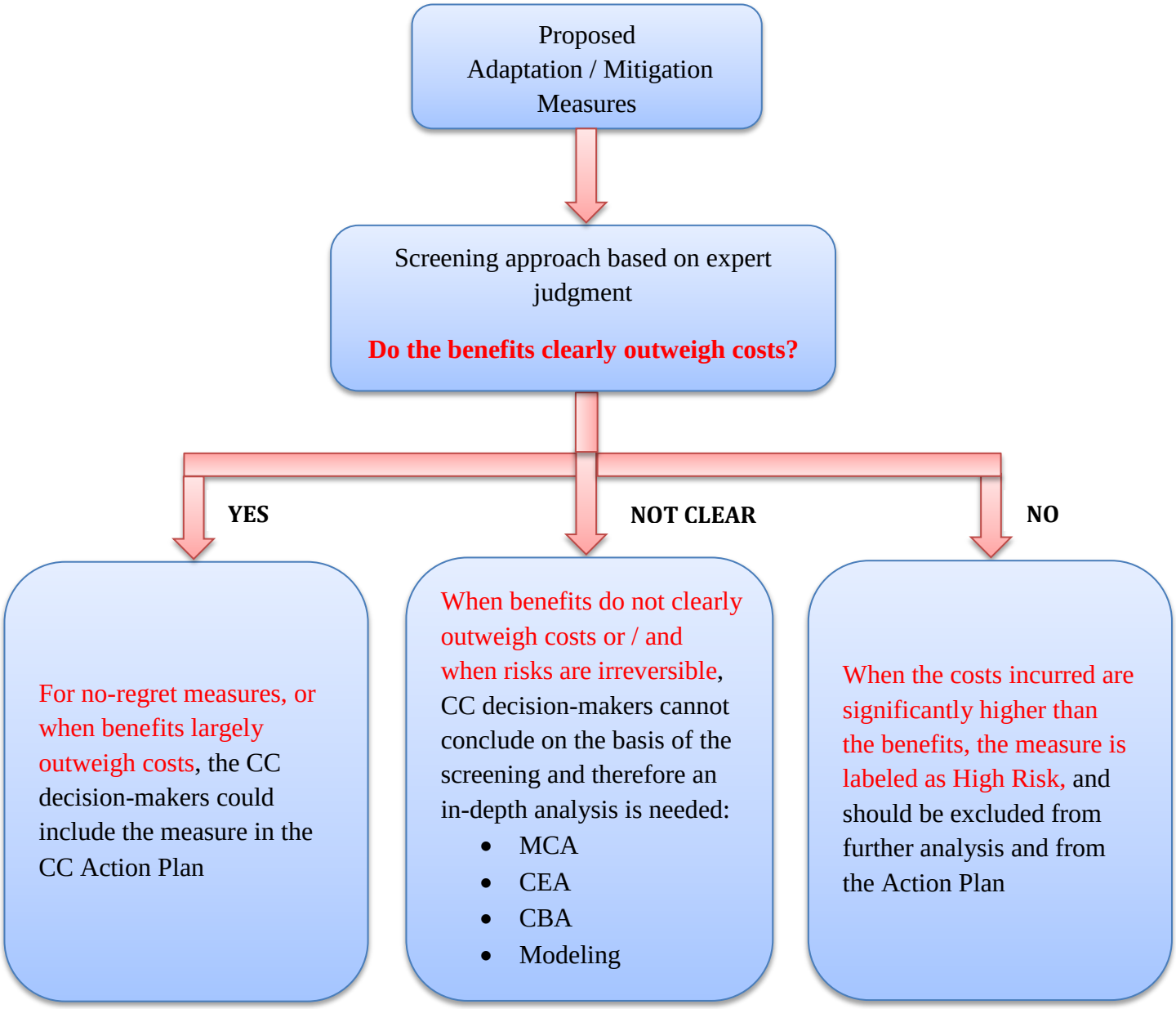
Technological risk can be defined as the probability of loss incurred through the execution of a technical process in which the outcome is uncertain. Untested engineering, technological or manufacturing procedures entail some level technical risk that can result in the loss of time, resources, and possibly harm to individuals and facilities. Technological risk is measured as an expected value derived from prior experience that led to undesirable results.

Taking action on CC requires innovative approaches to both building resilience to climate change and to reducing emissions of greenhouse gases at a scale not seen before. In order to reducing GHG emissions there is significant demand for large-scale innovation and fundamental changes to technologies for generating electricity, providing transportation, and powering industry, businesses, and homes. As these technology changes are made, many impacts will be beneficial. For example, improving vehicle fuel efficiency will result in both reduced emissions of GHGs and other pollutants, which will help improve or maintain air quality as well as reducing the cost for vehicle owners due to reduced demand for increasingly expensive petroleum products. However, significant technological changes, and particularly, massive roll-out of significant changes in technology, also have costs and risks included risks of unintended effects, insufficient technical capacity for a safe and sustainable operation, and potential needs for shifts and retraining in key job markets. New technologies that have not commercially matured bear the risk of proving unviable – at least in the medium term. Thus, the scale and speed of introducing new technologies should be carefully assessed.

4. AN OVERVIEW OF THE PROPOSED SCREENING APPROACH

The current chapter is aimed at describing the screening approach and its usefulness as a pragmatic decision making framework in the field of CC. Building a national CC action plan requires the identification, selection and implemention of an climate change mitigation and adaptaiton measures / options. It is impossible for Romania to undertake an in-depth analysis for the identification and the selection of each single CC action, in each sector. In-depth analysis such as multi-criteria (MCA), CBA, CEA or modeling are time-consuming and costly; these analyses are applied to measures that do not qualify under the ”no-regret” umbrella, or to measures where benefits do not clearly outweigh costs. For a major part of CC actions, relying on expert judgement to identify and select measures through this screening approach should be enough to include or exclude them in the action plan. The scheme below describe how the measures / options would be filtered through the screening process.

Figure 2. A Screening Approach for a Pragmatic and Transparent Decision-Making Process for CC Mitigation and Adaptation Measures



4.1 Screening for no-regret measures

"No-regret" (or so-called "win-win") measures are activities that provide benefits even in the absence of climate change. In many locations, the implementation of these actions constitutes a very efficient first step in a long-term adaptation or mitigation strategy. For example, controlling leakage in water pipes or maintaining drainage channels is almost always considered a very good investment from a cost–benefit analysis point-of-view, even in the absence of climate change.

GHG emissions reduction options are by definition no-regret measures when they have negative net costs, such as many energy efficiency measures. They provide clear monetized benefits that are large and quick enough to provide a good rate of return to the costs of implementing the measures. Improving building insulation norms and climate-proofing new buildings, which increases climate robustness, is another typical example of a no-regret strategy when energy savings can pay back the additional cost in only a few years.

The identification of no-regret options is largely dependent on local conditions. For instance, extending irrigation infrastructure can be considered as a no-regret measure in regions that already face water scarcity. In other regions with no significant water restrictions, considering the high investment costs of such a measure, it would be beneficial only if climate change significantly decreases precipitation.

Once no-regret measures / options have been identified, it is important to know why these no-regret actions have not yet been implemented. Delays in the implementation of no-regrets measures may be a result of (i) financial and technological constraints and gaps; (ii) institutional and legal burdens, (iii) lack of information and transaction costs at the micro-level. If such obstacles are identified they will need to be addressed when preparing the action plan on CC.

After no-regret measures are identified, second rank solutions will be "low-cost" actions. These options are considered to have relatively low additional cost and are estimated to provide relatively large benefits under predicted future climate scenarios. Among those, the CC action plan should particularly promote actions with multiple benefits which contribute to adaptation and/or mitigation whilst also having additional social, economic and environmental policy benefits.

This identification and ranking of mitigation and adaptation measures enables policy makers to prioritize the less risky and inexpensive options that could already provide benefits in the short run if implemented. One of the benefits of identifying no-regret and low cost options is that it enables responsible authorities to implement actions with multiple benefits in the short-term, while taking time to assess more expensive and complex measures.

4.2 Screening for No-Regret, Low-Risk and High-Risk Measures[3]

The current section explains the proposed screening approach in the context of Romania. It is aimed at providing a simple qualitative analysis of potential benefits and of the risk assessment of the main identified adaptation and mitigation measures / options. This analysis should be

[3] United Kingdom Climate Impacts Programme (UKCIP) Climate Adaptation: Risk, Uncertainty and Decision Making

based on expert judgment from sector specialists and MECC experts in the field of climate change, in order to allow a transparent decision making process to build the CC action plan.

The risks associated with climate change have many similarities across the EU. However, country-specific risks can be identified. To prepare a thorough risk assessment for Romania, it is important to identify which are and will be the major risks potentially associated to the implementation of CC "corrective" measures. At the same time it is important to highlight the potential benefits in terms of CC and in general for each measure.

The proposed screening process uses a qualitative approach designed to enhance the transparency of the decision making. The screening process is based on the understanding that even with the best possible mitigation and adaptation actions there will be residual CC-related risks. The screening process distinguishes three types of measures and proposes a different follow-up for each of these three categories:

- The No-Regret measures that do not incur major risks and provide high benefits; these should be directly included in the CC action plan;
- The low-regret measures, for which the costs and / or risks are high or medium and the benefits - even if potentially important - do not clearly outweigh costs; in this case, the screening will not be enough to conclude, therefore further in-depth analysis (MCA, CBA, CEA, modeling) is required to decide on their implementation;
- The "high-risk" measures, generating high risk and low or very low benefits. Through the screening process, experts should clearly highlight which types of risks (institutional, financial, technical, etc.) these measures are inducing. If the identified risks are high and the expected benefits (CC or overall) are low, the screening phase should conclude, without any additional in-depth analysis, that these measures should not be included in the CC action plan.

Concerning the potential risks induced by the measures, the screening will focus on financial, social, institutional, technical and technological risks in a Romanian context. The screening approach should help to underline the potential major risks associated with the implementation of climate change related mitigation and adaptation measures at least for six of the major sectors in Romania: agriculture and rural development, energy, urban, transport, forestry and water. The identified risks need to be counter-balanced with the benefits provided by the implementation of the mitigation and adaptation measures, such as diminishing climate change impacts, promoting innovation and competiveness, protecting human health and creating new economic activities.

The screening phase should help leave no-regret and low cost / significant benefit measures, as well as high risk and low benefit measures out of an in-depth risk assessment (using tools like CBA, CEA, multi-criteria, modeling, etc.), which will rather concentrate on measures with significant costs and risks, but with potential high benefits. Measures with the highest envisioned

impacts (financial, social, institutional, technical and technological) will have to undergo a quantitative analysis (CBA, CEA, multi-criteria, modeling, etc.) as soon as the screening reveals that the risks are high and cannot be clearly counter-balanced by expected benefits.

Applying the proposed qualitative analysis in real terms is not possible at this stage, as the proposed measures for the action plan have not yet been pre-selected in Romania. For the moment, the Annex 1 of this report provides an example of how to partially apply the screening process to the main recommendations (measures) for the energy sector derived from the rapid assessment report of the particular sector (component B of the CC RAS). Actions that pass through the screening process are qualitatively rated on the potential impact for specific types of risks (financial, social, institutional, technical and technological).

In Annex 1, each type of benefit and risk is assessed on the basis of expert judgment as: **High**, **Medium or Low**, depending on the potential benefits and adverse effects that the implementation of the proposed measure will have.

Two types of benefits are tested in the table of annex I, which serves for the screening of the measures / options. The climate change benefits directly expected as a result of the implementation of each specific measure, and the overall benefits (social, environmental, economic) of the proposed action.

The measures where a more in-depth analysis will be required have the following characteristics:

- Benefits are not obvious to identify or remain uncertain
- Benefits do not clearly outweigh risks (and associated costs)
- Risks are irreversible (building a dam)

Within the screening approach, once the benefits and the risks have been assessed the experts will have three choices:

- Directly accept that the considered measure / option will be included in the CC action plan;
- Directly reject a high risk measure with low benefits;
- Ask for an in-depth analysis (CBA, CEA, modeling) because it is not possible to conclude on the necessity to implement the measure only on the basis of expert judgment;

4.3 Additional Analytical Tools for CC Measures with Higher Risk or Uncertainty[4]

[4] Competence Center for Climate Change (2013). Economic approaches for assessing climate change adaptation options under certainty.

Measures dealing with mitigation and adaptation to climate change sometimes involve a physical investment. Based on the scale of investment costs and combined with the limited financial resources (EU, national, regional) in Romania, the following questions arise:

- How much can be invested in the next seven years (2014-2020) in the field of CC?
- What type of mitigation and adaptation options/measures should be prioritized?
- What is the best time and the right order to create the highest benefit at reasonable costs and within the available budget?

In some cases, the proposed screening approach is insufficient to effectively judge the potential impacts (financial, social, institutional, legal, technical, etc.) of the mitigation and adaptation measures / options. This means that the decision-makers are forced to try to optimizing the allocation of the financial resources without sufficient information. This optimization will lead to the prioritization and sequencing of mitigation and adaption actions during the next seven years and beyond. The Intergovernmental Panel on Climate Change (IPCC) has already proposed some methodologies to identify options for mitigating and adapting to climate change and to evaluate them in terms of criteria such as availability, benefits and costs, effectiveness, and efficiency (McCarthy et al., 2001). An economic assessment of CC options will basically deal with the measurement in monetary terms of associated benefits and costs, and with the evaluation of their efficiency and effectiveness. Against this background, it is not surprising that the UNFCCC (2002), along with GSF (2011) and Niang-Diop and Bosch (2011) suggest three main techniques to be applied in the economic assessment of climate change mitigation and adaptation options:

- Multi-Criteria Analysis
- Cost-effectiveness analysis (CEA);
- Cost-benefit analysis (CBA);

These three tools provide greater depth to the analysis and associated prioritization of mitigation and adaptation options when the screening approach demonstrates that potential important impacts could be generated by the implementation of a specific measure.

In addition to CBA, CEA and MCA, more complex modelling techniques can and should be used to assess sector-wide and economic-wide impacts of measures and, importantly, their combinations.

4.3.1 The Multi-criteria Analysis (MCA)

MCA describes any structured approach used to determine overall preferences among alternative options, where the options accomplish several objectives. In MCA, desirable objectives are specified and corresponding attributes or indicators are identified.

The actual measurement of indicators is usually based on quantitative analysis (using scoring, ranking weighting) for a wide number of qualitative impact categories and criteria. Various environmental and social indicators may be developed together with economic costs and benefits. A variety of both monetary and nonmonetary objectives may influence policy decisions. MCA provides techniques for comparing and ranking different outcomes.

Multi-criteria analysis or multi-objective decision making is a type of decision analysis tool that is particularly applicable to cases where a single-criterion approach (such as cost-benefit analysis) falls short, especially where significant environmental and social impacts cannot be assigned monetary values. MCA allows decision makers to include a full range of social, environmental, technical, economic, and financial criteria. The key outputs are a single most preferred option, ranked options, short list of options for further appraisal, or characterization of acceptable or unacceptable possibilities.

4.3.2 The Cost Benefit Analysis (CBA)

When building a CC action plan, that effectively identifies and prioritizes mitigation and adaptation measures / options, it is important to balance the need for streamlined and efficient decision making with the need for sufficient information particularly in context of high risks. Therefore activities that have been identified by expert judgment to possibly have significant costs and risks (financial, economic, social, institutional, etc.) and a range of benefits should undergo a more rigorous cost benefit analysis (CBA). The CBA requires the detailed identification and evaluation of the costs and benefits of the proposed measure.

The CBA is essential a tool to determine the public interest of a measure/project/action/option, and contribute to evaluating the costs (financial, social, economic, environmental, etc.) and compare them to expected benefits. This approach is in line with the Kaldor-Hicks potential compensation principle, which is a very widely accepted variation of the Pareto criterion (Pareto efficiency is achieved when it is not possible to make some people better off without making others worse off). This principle only requires that the net gains from an action are positive, and that benefits outweigh costs in order to implement the evaluated action. CBA is intended to help decision-makers to identify projects/programs/policies with potential net gains, by evaluating in monetary term all the relevant costs and benefits.

To be relevant, CBA must integrate different key criteria:

- At the beginning of a CBA, it is important to clarify the perspective from which the study will be undertaken (e.g. societal, governmental, financial, beneficiary, etc.). It is clear that the cost / benefit ratio of one measure can be largely different depending on the perspective (financial/environmental) and on the beneficiary (future generations/business environment) that will be chosen.

- It is of crucial importance to identify the potential impacts of the action evaluated: Ex ante, the CBA should propose a wide range of key potential consequences of the proposed action including for example financial needs, consumption of natural resources, GHG emissions, effects on local employment, and affordability. These ex-ante costs will be key factors to consider in the CBA.
- The CBA also has to allow a comparison of benefits and costs over time. This is particularly the case for CC mitigation and adaptation actions where benefits are expected in the very long run. The fundamental assumption within the CBA is that future costs and benefits are discounted or in other words count for less than present ones in particular due to uncertainty. To calculate the present values of future costs and benefits, it is important to select the appropriate discount rate, which is a difficult and sometimes controversial task.
- The CBA has to propose the conversion of costs and benefits (even indirect and environmental ones) into monetary terms. This means providing monetary values for social, environmental costs and benefits of the proposed measures (including adjustments for inflation and shadow prices, meaning prices of items which are not in the market);
- Project assessment: several indicators can be adopted to make judgments about the overall value of the action under going study (e.g. net present value, cost / benefit ratio, distribution of costs and benefits). The relationship between total benefits and total costs is not only a question of economic efficiency, but also a political issue related to who reaps the benefits and who bears the costs.

Limitations of the CBA are mainly related to the ethical choices and practical application involved. CBAs have been criticized on the basis of: (1) their inability to acknowledge value incommensurability; (2) distributional aspects (e.g. CBA treats gains and losses equally and is unconcerned with who gains and who loses), even assuming the possibility of appropriate compensation; (3) problems with discounting and accounting for future generations and non-human species; (4) their approach to dealing with risk, uncertainty, ignorance and ecosystem complexity, including non-linear and stochastic (random) relations; (5) treatment of irreversibility; (6) lack of a strong sustainability criteria; and (7) their reliance on consumer values which are a limited subset of all values in society (e.g. citizen values).

The challenges identified in performing a CBA for climate change adaptation are:
- Uncertainty of future impacts: the potential impacts of climate hazards are uncertain and may in fact be influenced by both local and global mitigation and therefore the benefits of adaptation actions are therefore to some degree also uncertain.
- Additionally, the limited information that exists on climate change and appropriate adaptation actions hinders the ability to correctly account for the costs and benefits.
- Taking account of benefits: Although it can be assumed that the benefits of climate change adaptation actions are tangible and measurable, not all of them are obvious and their true benefits might be difficult to quantify in monetary terms.

- Temporal effects: While a project has a specific time frame for its implementation, the effects (which can be measured in costs and benefits in the future) are not always evident and easy to assess, especially at the beginning of a project that is yet to be implemented.

4.3.3 The Cost Effectiveness Analysis (CEA)[5]

The Cost-Effectiveness Analysis (CEA) is an appraisal technique that provides a ranking of CC alternative measures/options on the basis of their costs and effectiveness, where the most cost effective has the highest ranking. The CEA proposed here takes an *economic* view of cost effectiveness. Making judgment about the most cost effective adaptation and mitigation **measures** which could be implemented in order to diminish the potential impacts of CC.

They are some key issues to look out for when conducting the cost-effectiveness analysis:

- Provide value added information to aid decision-makers;
- Be practical and proportionate, allowing for the costs of carrying out the analysis and the availability of data and the importance of the effects and costs in question;
- Fully cover the costs and economic impacts of measures for the different sectors, whilst avoiding double counting;
- Be applicable to a wide range of typologies of measures / options of a CC action plan (investments, legal tools, economic incentives, etc.);
- Be able to cover measures that incur costs and achieve effectiveness in different periods (building a dam or a dyke for flood protection will induce costs today but only generate benefits (costs avoided) when and if flood event happens in two, fifty or one hundred years);
- Be readily applicable in practice and capable of generating summary cost estimates across sectors and measures in order to aid decision-making on measures.

The key components of the CEA are the costs and effects of the CC measures / options. At times, this will minimize the risk of duplicating analysis, since most of the cost analysis for the cost and benefit assessment will have already been performed for the cost-effectiveness analysis. This consideration should influence the sequencing of CEA and CBA activities. Some other key points to consider throughout the process include:

- The cost-effectiveness analysis should be used to refine the CC action plan by focusing on the largest cost components and the major determinants of the effectiveness of measures. The analysis should then be used to develop packages of the most cost effective measures for achieving a signification reduction of expected CC impacts;

[5] European Commission (2003). Common Implementation Strategy for the Water Framework Directive (2000/60/EC). Guidance document no. 1. Economics and the environment. The implementation challenge of the Water Framework Directive

- Some measures have differing uncertainties concerning their effectiveness and costs. To allow for this, it would be desirable to use ranges of costs instead of point estimates;
- It is costly and time consuming to undertake a CEA. Therefore, the focus of the analysis should be on a limited number of CC measures / options and only when the screening approach does not clearly highlight that benefits exceed costs.

The analysis of cost-effectiveness can be broken down in five basic tasks:

- Defining the scale of the analysis

In terms CC the scale is of crucial importance when undertaking a CEA. Mitigation measures are always inducing local costs when the effectiveness of them is expected to be global (continent, planet). This is contrary to adaptions measures where both costs and effectiveness are expected to be local.

- Defining with extended time horizons

Mitigation measures (GHG emissions reduction) even if implemented today are only expected to demonstrate their effectiveness in the long run (impact on global warming), which is not the case of adaptation where the effectiveness can been seen just after their implementation. For instance, reducing significantly water leakages in networks will have immediate impacts on the water balance at the local level. These differences in time horizons for costs and benefits been to accounted for through discount rates and analysis.

- Determining the effects of measures on CC impacts

When selecting mitigation and adaptation options / measures to be integrated in a CC action plan, it is necessary to highlight ex-ante what are their potential CC impacts. For instance, promoting the shift towards renewable energies or promoting railways instead of seeing the future transport only via the angle of the increasing number of cars will have an effect on GHG emission reduction and on CC itself; promoting CC resilient crops will be effective both in terms of better yields and saving water in a CC context.

- Estimating the Costs of Proposed Measures

Only a few measures are “free of cost”. It could be the case that, as CC measures are often win-win solutions, the costs associated with their implementation may be underestimated. For instance, when speaking about transport in Romania a lot of reports recommend the maximization of the use of the Danube River as a waterway. This is a CC compatible measure; nevertheless to maximize navigation within the Danube infrastructures investments to reinforce dams and banks, would be required It is sometime the case that these secondary investments required to maximize the returns on an adaptation option are not included or are under-estimated.

- Assessing Cost Effectiveness

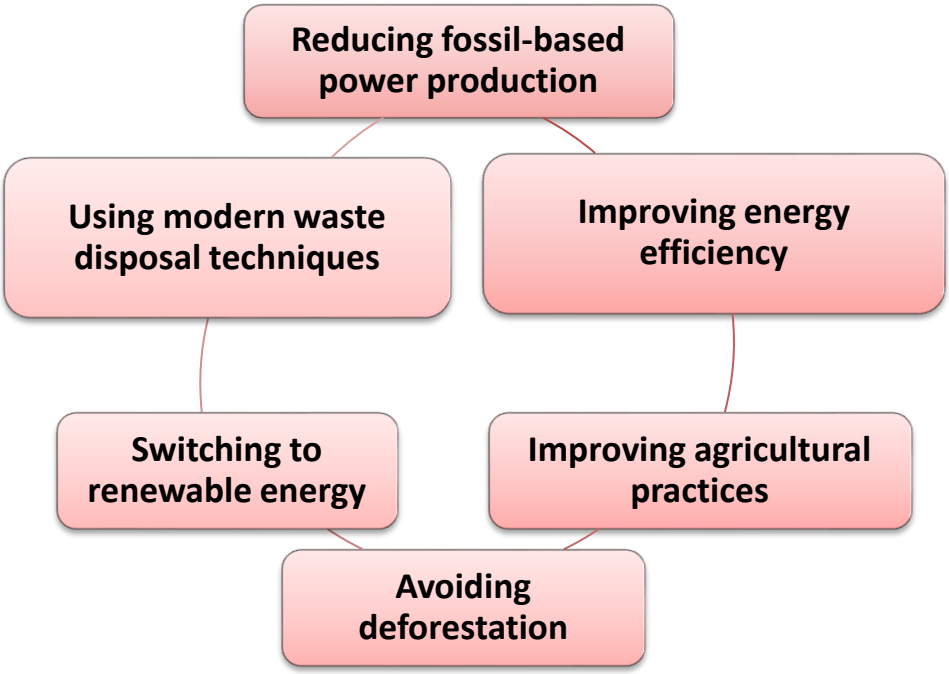
Cost-effectiveness can be presented in two ways: (i) costs divided by the effect, or (ii) effect divided by costs. The cost-effectiveness analysis itself can be broken down into a number of tasks:

- Analyze the costs of individual measures;
- Produce ranking of measures based on their cost-effectiveness;
- Produce an action plan to achieve the given objective;
- Rank alternative action plans to achieve a given objective based on their overall effectiveness.

Marginal Abatement Costs Curves (MACC) are an appropriate instrument for applying CEA for climate change mitigation measures.

MACC enables the comparison of the cost-effectiveness of mitigation options between different sectors (energy, agriculture, forestry transport). MACC ranks mitigation measures from least to most expensive. It allows estimating the costs (capital and operating costs) and the carbon reduction potential of each mitigation option proposed. In terms of the policy decision making process, MAC-curves[6] can be used to demonstrate the magnitude of abatement an economy can afford prioritizing actions by cost effectiveness regardless of the sector.

The diagram below provides an example of the type of alternative mitigation options that MAC curves allow evaluating and ranking in a cost effective way.



[6] Transition to a low carbon economy in Poland, The World Bank Poverty Reduction and Economic Management Unit Europe and Central Asia Region February 2011

If MAC Curves can be used to judge the effectiveness of mitigation actions, marginal adaptation costs curves can be used for adaptation actions. In 2013, the European Commission (DG Climate) developed software to identify *Optimal Strategies for Climate Change Action in Rural Areas* (OSCAR)[7]. OSCAR aimed to supporting the optimal design of climate change policies through the EU's rural development policy. The software includes tools to: identify hotspots within a region with respect to GHG emissions and adaptation; calculate and assess impacts on Mitigation (GHG emissions and carbon sequestration), Adaptation (adaptive capacity of ecosystem services) and Productivity (agricultural and land use production) by rural development plan operations within specific regions.

The performance of the selected operations can be ranked using the Mitigation, Adaptation and Productivity (MAP) criteria. OSCAR assesses the cost-benefit of rural development plan measures and operations, including the production of Marginal Abatement Cost (MAC) curves for mitigation and marginal adaptation costs curves for adaptation. The marginal adaptation costs curves enable the comparison of the cost-effectiveness of adaptation options (CC resilient crops, new technologies for irrigation, crops rotation) within the agricultural sector.

4.3.4. Modeling Tools

Modelling complements the above approaches, extending analysis from specific and/or simple measures or programs within a sector to complex measures with spill-over effect or bigger uncertainty or a combination of measures which impacts are across sectors and over a longer timeframe (for which a project specific CEA or CBA would not work). Particularly, there are some measures / options both for mitigation and adaptation where a qualitative screening will not be sufficient for robust decision-making on the inclusion or exclusion of certain activities in the action plan. This will likely be the case for measures / options where future impacts (CC and others) will remain potentially important and at the same time uncertain. Or, the actions potentially have significant spill-over effects influencing other sectors or overall economic impacts at macro-level.

Such economic assessments are often classified according to the type of models used. There are two main typologies:

- The first typology classifies models with respect to their economic (i.e. market and/or sector) coverage. Model inputs and outputs are mainly monetary values such as prices, revenues, rents, costs, etc. Frontier Economics Network (2008), Gambarelli and Goria (2004), and Robinson (2011) make use of this perspective and distinguish between partial equilibrium (PE) and general equilibrium (GE) models. Both types of models principally analyze costs and utilities (benefits) based on welfare economics.

[7] DG CLIMA, Ref: CLIMA.A.2/SER/2011/0025)

- The second typology does not use a pure economic concept, but combines economics with physics and other sciences. Models first provide information on physical indicators (such as yields, occurrence of health problems, damages, etc.), which – endogenously or exogenously depending on the model – can often be related to monetary values. Important approaches are very specific physical models (such as a crop model) and so-called Ricardian models (see UNFCCC, 2008; World Bank, 2011).

Models, whether PE and GE models or physical and Ricardian models can help for the assessment of climate change mitigation and adaptation options by providing information on both physical and economic impacts and trends of the selected measures / options for CC. They can be considered as supportive assessment approaches when building a CC action plan. The CC RAS (component C) will support Romania by proposing a modelling activity which will help to reinforce the analytical capacity of Romanian authorities in the field of climate change.

The modeling activity will help to forecast impacts, build scenarios, to establish targets, to assess costs, and to highlight benefits for different measures / options dealing with mitigation or adaptation in different sectors. As the modeling activity is a complex and costly exercise looking at a very long-term horizon (2050), it is important that it is complemented by a simpler pragmatic approach to prioritize short-term and medium term measures. Having both a modelling toolkit (being developed under component C) and action planning tools (for component A) will provide sufficient information to meet various objectives and understanding of all aspects of assessing climate change and green growth options and strategies.

5. CONCLUSION

A national action plan is a major step in the implementation of efficient climate change policies. Measures to be promoted within this action plan will need to be analyzed with consideration of both associated risks and the potential benefits. The selection of the measures and their analysis will need to be as transparent as possible, and involve the key actors (line ministries, Government agencies, etc.) in the main sectors. This will help promote ownership of the national CC action plan.

The screening approach is the first step to analyze climate change measures or options. It will maximize efficiency and minimize time and costs from dedicated in-depth analysis. Detailed analysis such as multi-criteria analysis, CBA, CEA, or other sectoral or macro-economic models will only be undertaken for measures, where benefits do not clearly outweigh risks. Nevertheless, when the screening approach highlights that expected benefits are low or even medium, but that some types of risks (financial, institutional, etc.) are high, it will be necessary to undertake an in-depth analysis before selecting or rejecting a particular measure / option,.

ANNEX I

How to implement a screening process for risk analysis in the selection of CC measures / options in Romania?

Example for the Energy Sector

The table below and the measures included in them are a hypothetical demonstration exercise based on extrapolations rather than verified data. Some columns have been filled just to show what could be the result of a well-organized and transparent sectoral expert consultation. The main goals of this type of screening are to;

- Ensure that all the proposed measures / options will have gone through a transparent consultation with relevant experts and institutions;
- Save costs and time by selecting a number of key measures through the screening process without deeper analysis. This is the case when benefits undoubtedly surpass risks (and associated costs);
- Ensure that the measures / options that will be proposed for a more in-depth analysis (CBA, CEA, and modeling) will go through the more costly and time consuming analysis only after a well justified request from the experts;
- Finally, allow a transparent debate on the mitigation and adaptation measures to be included in the CC action plan.

The current annex proposes a table (as a tool box) to facilitate the future screening of the measures / options for each of the 6 major sectors (water, energy, transport, urban, agriculture and rural development, forestry). The measures / options included in the table are only indicative. They have been included in the table in order to make the demonstration of the screening exercise. Filling the different columns of the proposed table for each sector should not be seen as an individual exercise neither from the WB nor from the MECC. The identification of benefits and risks should be based on consultation with relevant experts of MECC, other line ministries and other recognized specialists (academics, industrialists) within the considered sector.

Legend and Categories of Measures

Investments	INV
Economic Incentive	ECON I.
Legal Tool & Standards	LEG & S
Technical Assistance	TA
Selection of Technologies	S.TECH

ANNEX II

An Example of Testing the Screening Methodology - Energy Sector

The table below includes some priority measures for the energy sector. **The measures / options proposed are purely indicative and part of an exercise meant to visualize how the screening approach should be implemented by the competent experts of each dedicated sector, when the actual measures / options will be selected within the preparation process of the CC action plan**. The experts that are part of the different competent authorities will have to qualify the benefits and relevant costs as high, medium or low. Each measure will have to be ranked (high, medium or low) for every category (climate change benefits, financial risks, social risks, institutional risks, technical risks, technological risks, overall benefits).

Sectoral Focus / Actions/ category (type)		Overall Benefits	CC Benefits	Financial Risks	Social Risks	Institutional Risks	Technical Risks	Technological Risks	Recommendation
Expanding cleaner power supplies									
➢ Wind and solar PV generation capacity	INV	medium	Medium	high	NA	NA	high	NA	Go for case by case CBA
➢ Balancing infrastructure for increased wind and solar generation capacity	INV	medium	medium	high	NA	NA	NA	high	Need further analysis
➢ High-efficiency gas-fired generation capacity	INV	high	high	medium	low	NA	NA		implement
➢ Modernization of distribution network	INV	high	high	medium	low	low	medium		implement
Restructuring district heating									
➢ Modernization of economically viable district heating systems	INV	high	high	medium	medium	low	low	low	implement
Scaling up energy efficiency									
➢ Thermal retrofit of apartment buildings constructed during 1950-90	INV	high	high	medium	medium	NA	low	low	implement
➢ Energy intensity reduction of chemicals and steel manufacturing	INV	high	high	medium					
➢ Energy efficiency obligations for energy utilities to address disaggregated energy efficiency investments in residential, commercial and public services	LEG&S	high	high	low	low	medium	low	low	implement

and industrial sectors									

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